

WHAT IS CLAIMED IS:

1. An RF-MEMS switch comprising:
  - a substrate;
  - an RF signal-conducting unit arranged on the substrate;
  - a plurality of movable electrodes having a space provided therebetween in a direction of signal conduction of the RF signal-conducting unit and arranged above the RF signal-conducting unit; and
  - a movable electrode displacing unit for displacing the plurality of movable electrodes at the same time in the same direction towards or away from the RF signal-conducting unit; wherein
    - when all of the plurality of movable electrodes are displaced in the direction away from the RF signal-conducting unit by the movable electrode displacing unit so as to be disposed at positions where a signal is switched on, conduction of an RF signal of the RF signal-conducting unit is switched on;
    - when all the plurality of movable electrodes are displaced in the direction towards the RF signal-conducting unit by the movable electrode displacing unit so as to be disposed at positions where the signal is switched off, conduction of the RF signal of the RF signal-conducting unit is switched off; and
    - an electrical length for the RF signal-conducting unit sandwiched between the plurality of movable electrodes is such that an amplitude of a combined signal composed of RF signals reflected at positions of the RF signal-conducting unit facing the plurality of movable electrodes is less than an amplitude of each of signals reflected at positions of the RF signal-conducting unit facing the plurality of movable electrodes when the plurality of movable electrodes are disposed at positions where the signal is switched on.
2. An RF-MEMS switch according to Claim 1, wherein the plurality of movable electrodes include a pair of movable electrodes, and when the pair of movable electrodes is disposed at positions where the signal is switched on by the movable

electrode displacing unit, the electrical length for the RF signal-conducting unit sandwiched between the pair of movable electrodes is approximately equal to a quarter of the wavelength of the conducting RF signal of the RF signal-conducting unit.

3. An RF-MEMS switch according to Claim 1, further comprising a protective insulating film provided on at least one of the surfaces of the RF signal-conducting unit and the movable electrodes, the surface of the RF signal-conducting unit being opposite to the surfaces of the movable electrodes.

4. An RF-MEMS switch according to Claim 1, wherein the RF signal-conducting unit includes one of a coplanar line and a microstrip line, and the RF-MEMS switch is a shunt switching device for switching on or off the conduction of the signal of the coplanar line or the microstrip line functioning as the RF signal-conducting unit by utilizing a change in the capacitance between the movable electrodes and the RF signal-conducting unit.

5. An RF-MEMS switch according to Claim 1, wherein the RF-MEMS switch is a switching device for switching on or off the conduction of the signal of the RF signal-conducting unit by one of separation and direct contact of at least a portion of the movable electrodes and the RF signal-conducting unit that face each other.

6. An RF-MEMS switch comprising:  
a substrate;  
an RF signal-conducting unit arranged on the substrate;  
a movable element disposed above the substrate with a space provided therebetween and facing at least a portion of the RF signal-conducting unit;  
a plurality of movable electrodes arranged on the movable element and facing the RF signal-conducting unit; and  
a movable element displacing unit for displacing the movable element in a direction towards or away from the substrate via electrostatic attraction; wherein  
the plurality of movable electrodes is disposed with a space provided therebetween in the direction of signal conduction of the RF signal-conducting unit; and

the RF signal-conducting unit located between the plurality of movable electrodes defines a transmission line having a length that is less than or equal to a quarter of a wavelength of the conducting RF signal of the RF signal-conducting unit such that the RF signal-conducting unit located between the plurality of movable electrodes provides a characteristic impedance that is greater than a system impedance.

7. An RF-MEMS switch according to Claim 6, further comprising fixed electrodes arranged on the substrate and facing a portion of the movable element, wherein the movable element includes a high-resistivity semiconductor which defines an insulator for an RF signal and an electrode for a low-frequency signal and a DC signal, and the fixed electrodes and the movable element define the movable element displacing unit for displacing the movable element towards the fixed electrodes using electrostatic attraction produced by a DC voltage applied between the fixed electrodes and the movable element.

8. An RF-MEMS switch according to Claim 6; further comprising an upper member facing a top portion of the movable element with a space provided therebetween and fixed electrodes arranged on the upper member to face at least a portion of the movable element, wherein the movable element includes a high-resistivity semiconductor defining an insulator for an RF signal and an electrode for a low-frequency signal and a DC signal, and the fixed electrodes and the movable element define the movable element displacing unit for displacing the movable element towards the fixed electrodes using electrostatic attraction caused by a DC voltage applied between the fixed electrodes and the movable element.

9. An RF-MEMS switch according to Claim 6, wherein the RF signal-conducting unit includes one of a coplanar line and a microstrip line, and the RF-MEMS switch is a shunt switching device for switching on or off the conduction of the signal of the coplanar line or the microstrip line functioning as the RF signal-conducting unit by utilizing a change in the capacitance between the movable electrodes and the RF signal-conducting unit.

10. An RF-MEMS switch according to Claim 6, wherein the RF-MEMS switch is a switching device for switching on or off the conduction of the signal of the RF signal-conducting unit by one of separation and direct contact of at least a portion of the movable electrodes and the RF signal-conducting unit that face each other.

11. An RF-MEMS switch according to Claim 6, further comprising fixed electrodes arranged on the substrate and facing a portion of the movable element and movable element displacing movable electrodes arranged at positions of the movable element corresponding to the fixed electrodes, wherein the movable element includes a semiconductor exhibiting insulation performance for an RF signal or an insulator, and the movable element displacing movable electrodes and the fixed electrodes define the movable element displacing unit for displacing the movable element towards the fixed electrodes using electrostatic attraction caused by a DC voltage applied between the fixed electrodes and the movable element displacing movable electrodes.

12. An RF-MEMS switch comprising:  
a substrate;  
an RF signal-conducting unit arranged on the substrate;  
a plurality of movable elements disposed with a space provided therebetween in the direction of signal conduction of the RF signal-conducting unit, arranged above the substrate with a space provided therebetween, and facing at least a portion of the RF signal-conducting unit;

movable electrodes arranged on the corresponding movable elements and facing the RF signal-conducting unit; and

a movable element displacing unit for displacing the movable elements in the direction towards or away from the substrate using electrostatic attraction; wherein

the RF signal-conducting unit located between the plurality of movable electrodes defines a transmission line having a length that is less than or equal to a quarter of the wavelength of the conducting RF signal of the RF signal-conducting unit such that the RF signal-conducting unit located between the plurality of movable electrodes provides a characteristic impedance is greater than a system impedance.

13. An RF-MEMS switch according to Claim 12, wherein the movable element includes a plurality of movable electrodes, and the plurality of movable electrodes are disposed with a space provided therebetween in the direction of the signal conduction of the RF signal-conducting unit.

14. An RF-MEMS switch according to Claim 12, further comprising fixed electrodes arranged on the substrate and facing a portion of the movable element, wherein the movable element includes a high-resistivity semiconductor which defines an insulator for an RF signal and an electrode for a low-frequency signal and a DC signal, and the fixed electrodes and the movable element define the movable element displacing unit for displacing the movable element towards the fixed electrodes using electrostatic attraction produced by a DC voltage applied between the fixed electrodes and the movable element.

15. An RF-MEMS switch according to Claim 12, further comprising an upper member facing a top portion of the movable element with a space provided therebetween and fixed electrodes arranged on the upper member to face at least a portion of the movable element, wherein the movable element includes a high-resistivity semiconductor defining an insulator for an RF signal and an electrode for a low-frequency signal and a DC signal, and the fixed electrodes and the movable element define the movable element displacing unit for displacing the movable element towards the fixed electrodes using electrostatic attraction caused by a DC voltage applied between the fixed electrodes and the movable element.

16. An RF-MEMS switch according to Claim 12, further comprising a protective insulating film provided on at least one of the surfaces of the RF signal-conducting unit and the movable electrodes, the surface of the RF signal-conducting unit being opposite to the surfaces of the movable electrodes.

17. An RF-MEMS switch according to Claim 12, wherein the RF signal-conducting unit includes one of a coplanar line and a microstrip line, and the RF-MEMS

switch is a shunt switching device for switching on or off the conduction of the signal of the coplanar line or the microstrip line functioning as the RF signal-conducting unit by utilizing a change in the capacitance between the movable electrodes and the RF signal-conducting unit.

18. An RF-MEMS switch according to Claim 12, wherein the RF-MEMS switch is a switching device for switching on or off the conduction of the signal of the RF signal-conducting unit by one of separation and direct contact of at least a portion of the movable electrodes and the RF signal-conducting unit that face each other.

19. An RF-MEMS switch according to Claim 12, further comprising fixed electrodes arranged on the substrate and facing a portion of the movable element and movable element displacing movable electrodes arranged at positions of the movable element corresponding to the fixed electrodes, wherein the movable element includes a semiconductor exhibiting insulation performance for an RF signal or an insulator, and the movable element displacing movable electrodes and the fixed electrodes define the movable element displacing unit for displacing the movable element towards the fixed electrodes using electrostatic attraction caused by a DC voltage applied between the fixed electrodes and the movable element displacing movable electrodes.